

Linda McCartney Centre: Early Breast Cancer Management Guidelines Decision Model

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Process and decision models representing the Linda McCartney Hospital guidelines for breast cancer treatment.

Linda McCartney Centre: Early Breast Cancer Management Guidelines Decision Model

Breast Radiotherapy

Treatment Options

BRT1 No breast radiotherapy (omissions or absolute contra-indications)

BRT2 Consider breast radiotherapy

BRT3 Breast radiotherapy

Variables Used for Decision

Breast Surgery

WLE, Mastectomy

Post –Op Node Status

Negative, 1-3, 4+

TNM Tumour Classification

TX, T0, T1, T2, T3, T4

Absolute Contra-Indications Present

Yes, No

- Early stages of pregnancy
- Multicentric disease
- Diffuse micro-calcifications on mammography

Relative Contra-Indications Present

Yes, No

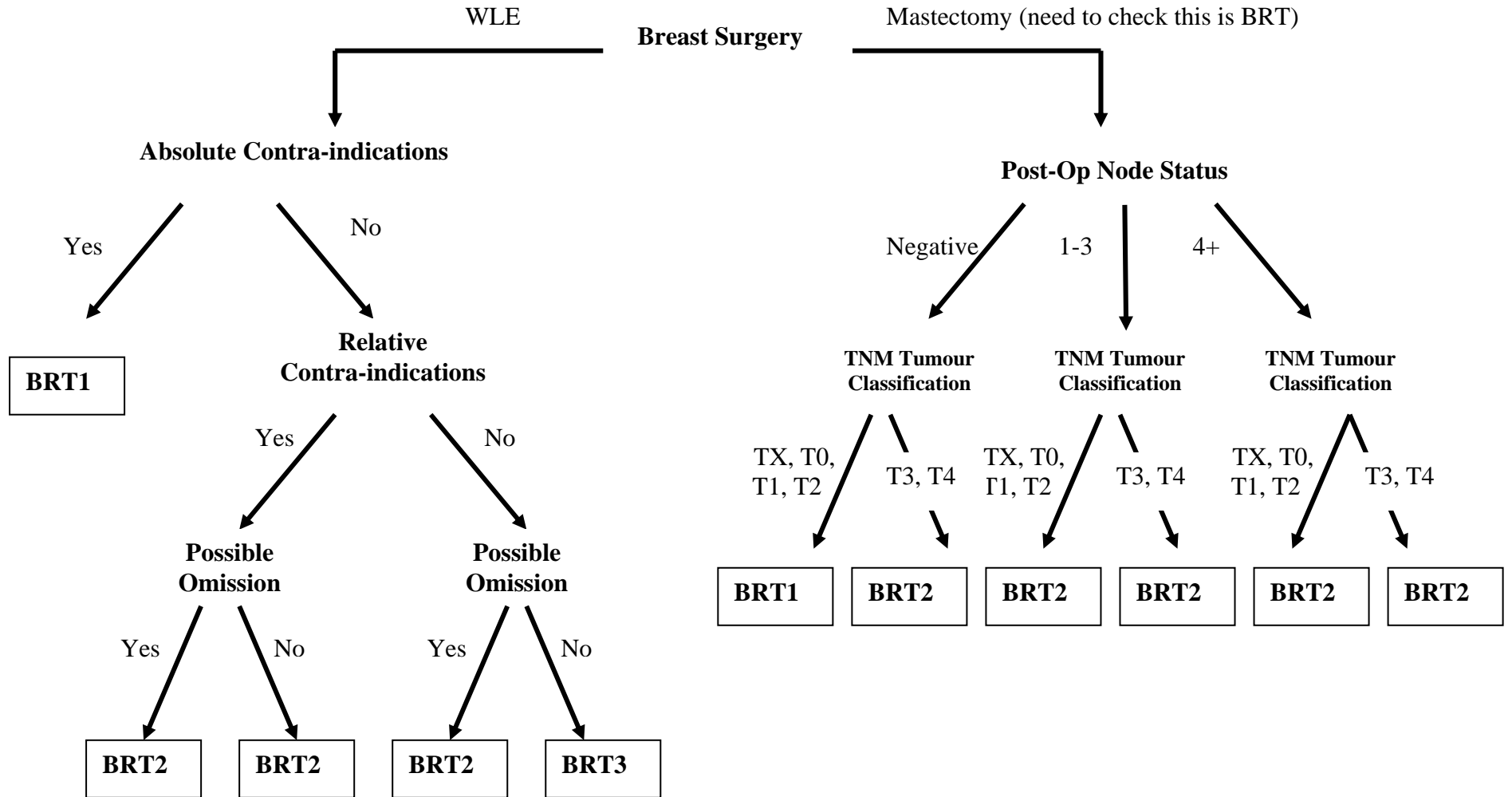
- Large tumour/breast ratio
- Connective tissue disease
- Large breast size
- Tumour location beneath the nipple

Possible Omission

Low grade tumours ≤ 0.5 cm (5mm)

Frail patient

Decision Tree for Breast Radiotherapy



Rules for Breast Radiotherapy

BRT1: No breast radiotherapy

(IF Breast Surgery = WLE
AND
Absolute Contra-Indications = Yes)

OR

(IF Breast Surgery = Mastectomy
AND
Post-Op Node Status = Negative
AND
TNM Tumour Classification = TX OR T0 OR T1 OR T2)

BRT2: Consider breast radiotherapy

(IF Breast Surgery = WLE
AND
Absolute Contra-Indications = No
AND
Relative Contra-Indications = Yes
AND
Possible Omission = Yes or No)

OR

(IF Breast Surgery = WLE
AND
Absolute Contra-Indications = No
AND
Relative Contra-Indications = No
AND
Possible Omission = Yes)

OR

(IF Breast Surgery = Mastectomy
AND
Post-Op Node Status = Negative
AND
TNM Tumour Classification = T3 OR T4)

OR

(IF Breast Surgery = Mastectomy
AND
Post-Op Node Status \neq Negative)

BRT3: Breast radiotherapy

(IF Breast Surgery = WLE
AND
Absolute Contra-Indications = No
AND
Relative Contra-Indications = No
AND
Possible Omission = No)

Breast Boost Radiotherapy

This model is dependant on who will benefit most from this treatment it is not routine for all patients. It is most beneficial in patient under 50 years of age, although age is included in the guidelines and in the decision tree it is not used in the rules.

Treatment Options

BB1 No breast boost radiotherapy

BB2 Breast boost radiotherapy

BB3 Option of breast boost radiotherapy

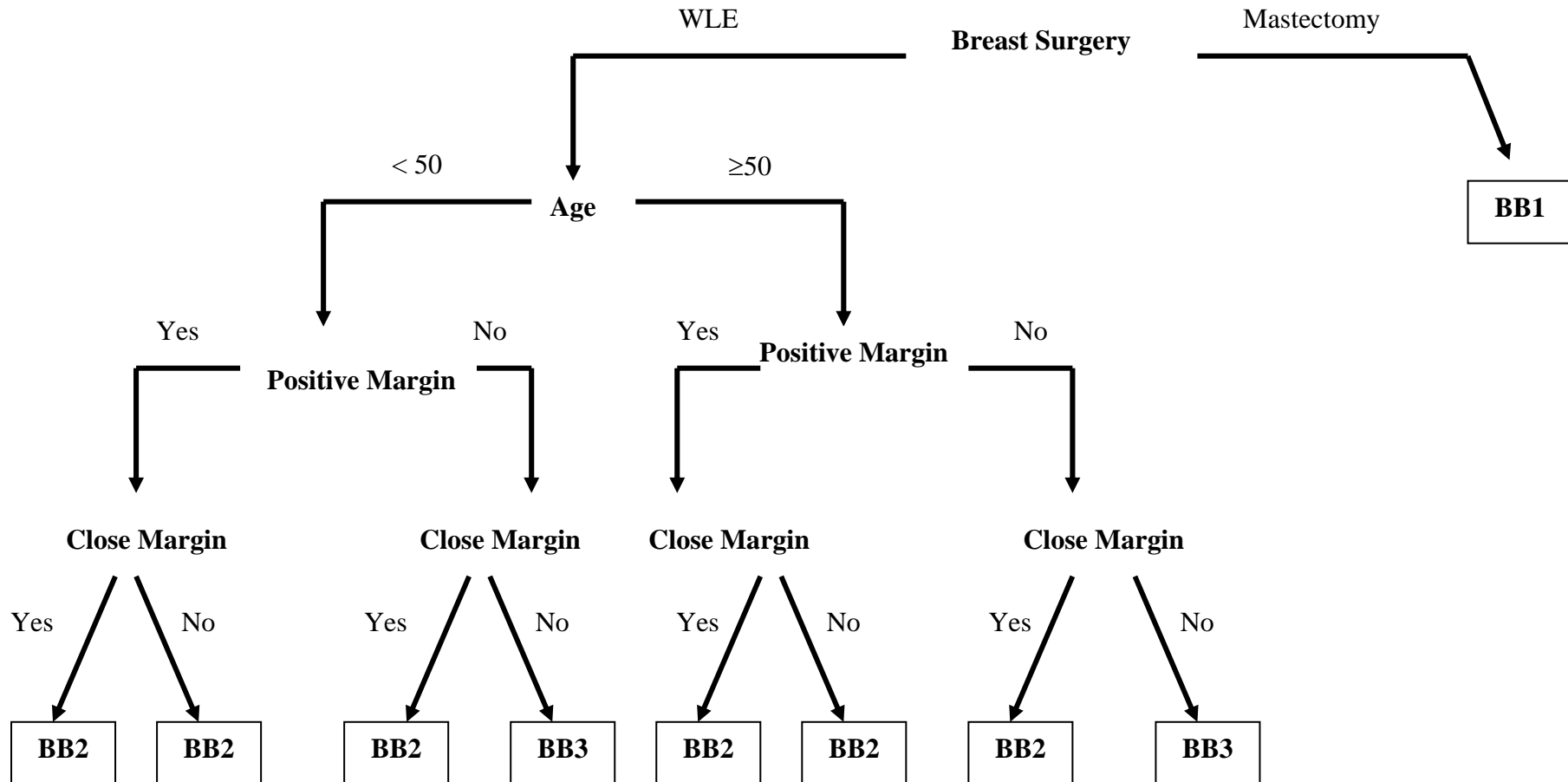
Variables Used for Decision

Age < 50, ≥50

Positive Margin Yes, No

Close Margin Yes, No

Decision Tree for Breast Boost Radiotherapy



Rules for Breast Boost Radiotherapy

BB1: No breast boost radiotherapy

IF Breast Surgery = Mastectomy

BB2: Breast boost radiotherapy

(IF Breast Surgery = WLE

AND

(Positive Margin = Yes

OR

Close Margin = Yes)

BB3: Option of breast boost radiotherapy

(IF Breast Surgery = WLE

AND

(Positive Margin = No

AND

Close Margin = No)

Axillary Radiotherapy

Treatment Options

- AR1 No axillary radiotherapy
- AR2 Consider axillary radiotherapy
- AR3 Usually perform axillary radiotherapy

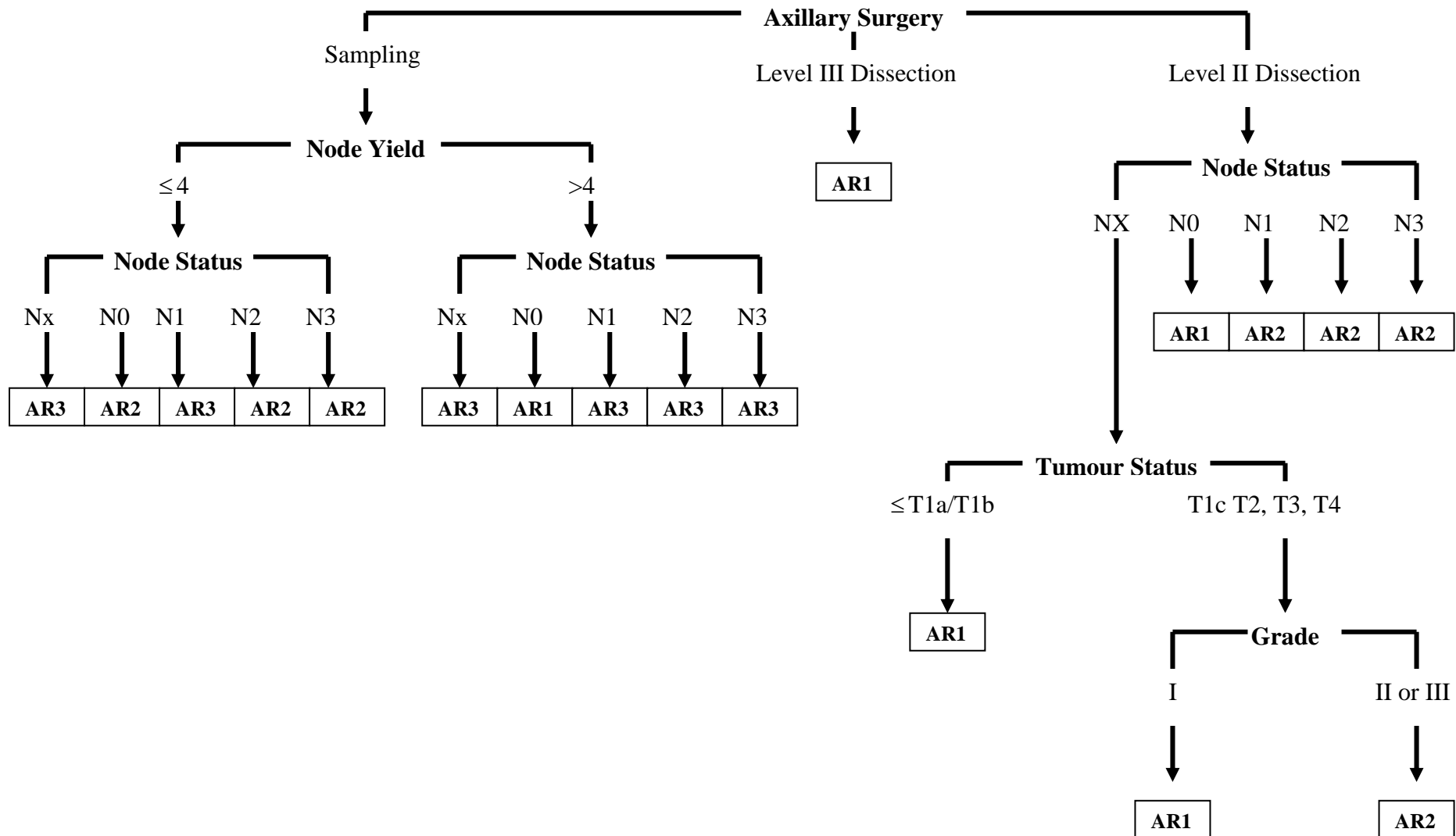
Variables Used for Decision

Axillary Surgery	Sampling, Level I, Level II, Level III
Node Status	NX, N0, N1, N2, N3
Tumour Status	TX, T0, T1, T2, T3, T4
No of Nodes Removed	≤ 4 , 4+
Histopathological Grade	I, II, III

The variables below are included in the guidelines but they need checking with Sue before they are included in the decision model, they seem to contradict each other sometimes.

Risk of Residual Disease	Low, High	What is used to measure this?
Single Node with Micrometastases	Yes, No	
Using a Hypo Fractured Weekly Regime	Yes, No	

Decision Tree for Axillary Radiotherapy (As near as I could get it – needs checking)



Rules for Axillary Radiotherapy (Needs checking)

AR1: No axillary radiotherapy

(IF Axillary Surgery = Level III)

OR

(IF Axillary Surgery = Sampling

AND

Node Yield > 4

AND

Node Status = N0)

OR

(IF Axillary Surgery = Level II

AND

Node Status = N0)

OR

(IF Axillary Surgery = Level II

AND

Node Status = NX

AND

Tumour Status ≤ T1b)

OR

(IF Axillary Surgery = Level II

AND

Node Status = NX

AND

Tumour Status > T1b

AND

Grade = I)

AR2: Consider axillary radiotherapy

(IF Axillary surgery = Sampling

AND

Node Yield ≤ 4

AND

Node Status = N0 OR N2 OR N3)

OR

(IF Axillary Surgery = Level II
AND
Node Status = N0 OR N1 OR N2 OR N3)

OR

(IF Axillary Surgery = Level II
AND
Tumour Status \geq T1c
AND
Grade = II OR III)

AR3: Usually perform axillary radiotherapy

(IF Axillary surgery = Sampling
AND
Node Yield \leq 4
AND
Node Status = NX OR N1)

OR

(IF Axillary surgery = Sampling
AND
Node Yield $>$ 4
AND
Node Status = NX OR N2 OR N3)

Selection of Adjuvant Systemic Treatment for Early Breast Cancer

Variables Used to Determine Risk Group

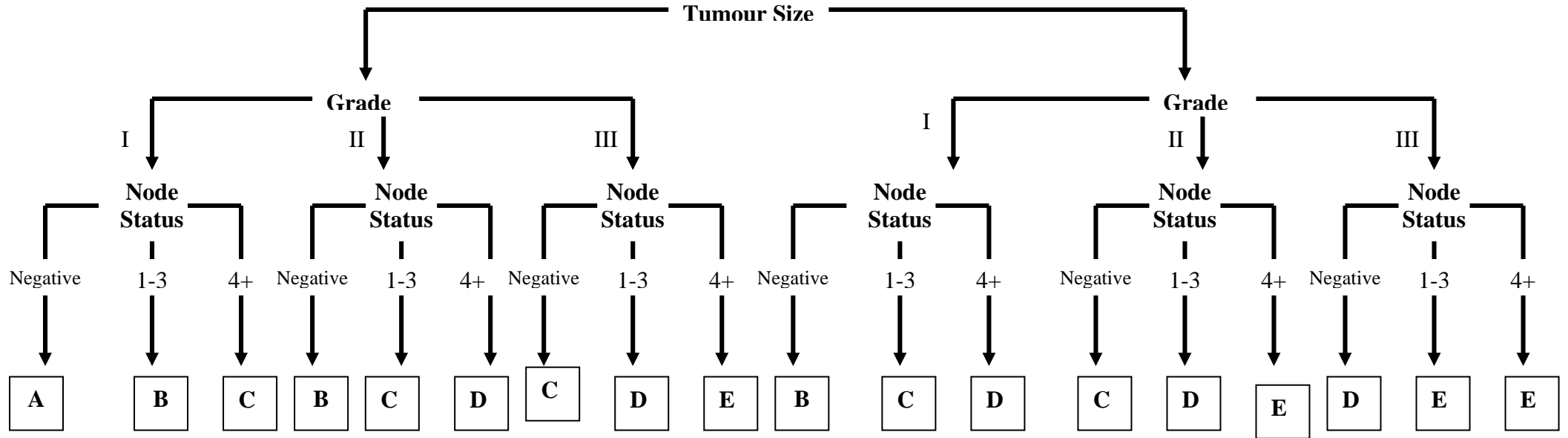
The Linda McCartney centre uses the Nottingham prognostic index, which uses the following variables:

Pathological Tumour Size	In cm
Histopathological Grade	I, II, III
Post-Op Node Status	Negative, 1-3, 4+

The centres uses the actual numerical values of the NPI and not the risk group, i.e good, intermediate or poor. Using this index, patients can be divided into 5 groups with a 10 year survival without adjuvant treatment ranging from 20% to 95%.

NPI	Stage	10 year survival
≤ 2.4	T ₁ G ₁ N ₀	95%
2.41 – 3.4	T ₁ G ₁ N ₁₋₃ T ₁ G ₂ N ₀ T _{>1} G ₁ N ₀	85%
3.41 - 4.4	T ₁ G ₁ N ₄₊ T ₁ G ₂ N ₁₋₃ T ₁ G ₃ N ₀ T _{>1} G ₁ N ₁₋₃ T _{>1} G ₂ N ₀	70%
4.41 – 5.4	T ₁ G ₂ N ₄₊ T ₁ G ₃ N ₁₋₃ T _{>1} G ₁ N ₄₊ T _{>1} G ₂ N ₁₋₃ T _{>1} G ₃ N ₀	50%
> 5.4	T _{>1} G ₂ N ₄₊ T _{>1} G ₃ N ₁₋₃ T _{ANY} G ₃ N ₄₊	20%

NPI Table Represented by a Tree Diagram



	NPI Value
A	≤ 2.4
B	2.41-3.4
C	3.41-4.4
D	4.41-5.4
E	> 5.4

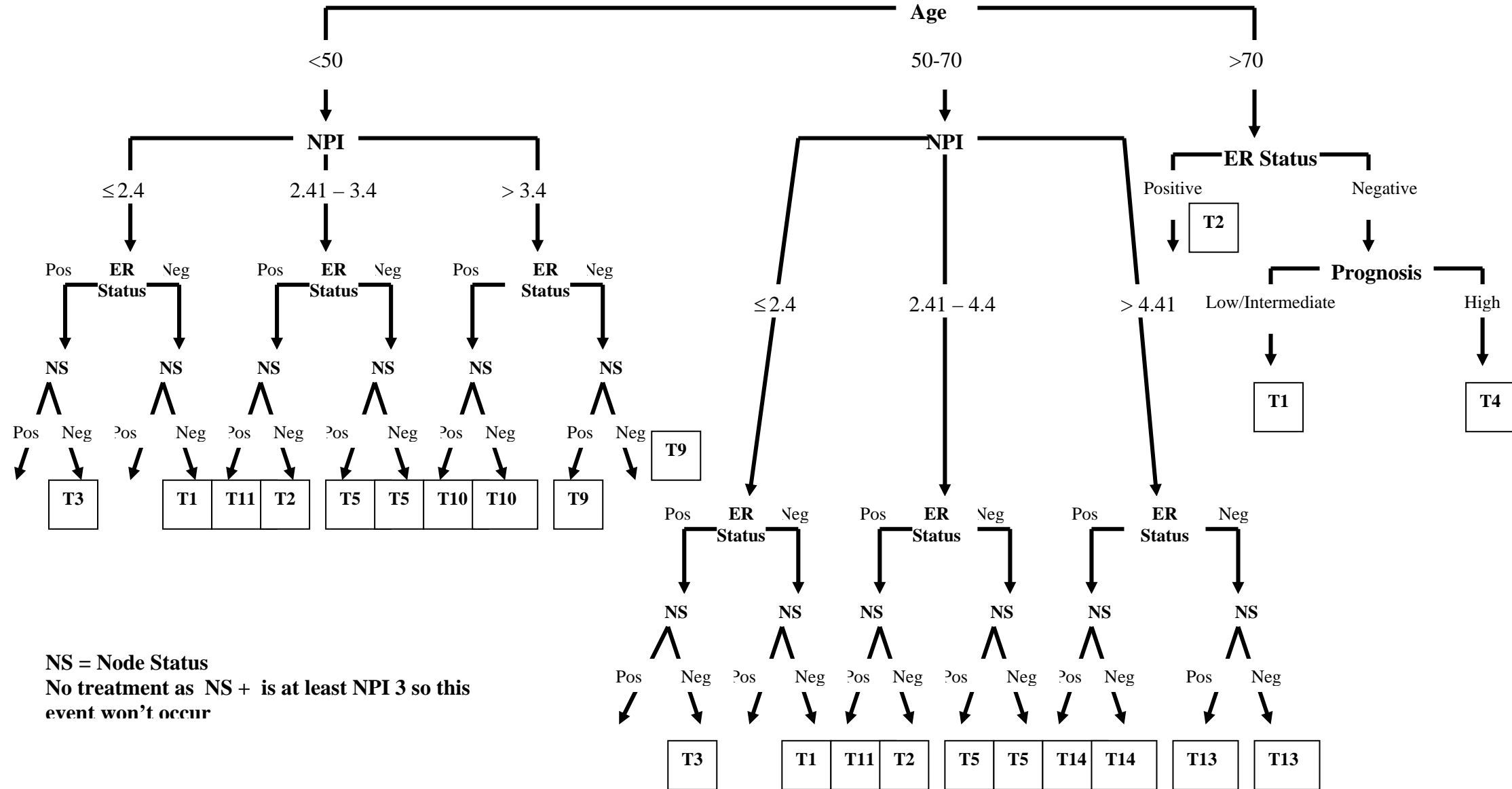
Variables Used to Determine Treatment

Age	<50, 50-70, >70
NPI Value	Value
NPI Prognosis	Low, Intermediate High
ER Status	Positive, Negative
Post-Op Node Status	Positive, Negative

Treatments and Treatment Combinations

T1	No adjuvant treatment
T2	Tamoxifen
T3	(T1) or (T2)
T4	Consider chemotherapy
T5	Discuss chemotherapy
T6	Chemotherapy recommended
T7	Consider anthracycline based chemotherapy
T8	(Consider anthracycline based chemotherapy) and (Tamoxifen)
T9	Anthracycline based chemotherapy recommended
T10	(Anthracycline based chemotherapy recommended) and (Tamoxifen)
T11	(T2) and (T5)
T12	(Chemotherapy recommended) and (Tamoxifen)
T13	(T6) and (T7)
T14	(T6) and (T8)

Decision Tree for Selection of Adjuvant Systemic Treatment for Early Breast Cancer



Rules for the selection of Adjuvant Systemic Treatment for Early Breast Cancer

T1: No adjuvant treatment

(IF Age \leq 70
AND
NPI \geq 2.4
AND
ER Status = Negative
AND
Node Status = Negative)

OR

(IF Age $>$ 70
AND
ER Status = Negative
AND
Prognosis = Low OR Intermediate)

T2: Tamoxifen

(IF Age $<$ 50
AND
NPI = 2.41-3.4
AND
ER Status = Positive
AND
Node Status = Negative)

OR

(IF Age = 50-70
AND
NPI = 2.41-4.4
AND
ER Status = Positive
AND
Node Status = Negative)

OR

(IF Age $>$ 70
AND
ER Status = Positive)

T3: No adjuvant treatment or Tamoxifen

IF Age \leq 70

AND

NPI \geq 2.4

AND

ER Status = Positive

AND

Node Status = Negative

T4: Consider chemotherapy

(IF Age $>$ 70

AND

ER Status = Positive)

T5: Discuss chemotherapy

((IF Age $<$ 50

AND

NPI = 2.41-3.4)

OR

(IF Age = 50-70

AND

NPI = 2.41-4.4))

AND

ER Status = Negative

T9: Anthracycline based chemotherapy recommended

IF Age $<$ 50

AND

NPI $>$ 3.4

AND

ER Status = Negative

T10: (Anthracycline based chemotherapy recommended) and (Tamoxifen)

IF Age $<$ 50

AND

NPI $>$ 3.4

AND

ER Status = Positive

T11: Tamoxifen and discuss chemotherapy

((IF Age < 50

AND

NPI = 2.41-3.4)

OR

(IF Age = 50-70

AND

NPI = 2.41-4.4))

AND

ER Status = Positive

AND

Node Status = Positive

T13: (Chemotherapy recommended) and (Consider anthracycline based chemotherapy)

IF Age = 50-70

AND

NPI > 4.41

AND

ER Status = Negative

T13: (Chemotherapy recommended) and (Consider anthracycline based chemotherapy) and (Tamoxifen)

IF Age = 50-70

AND

NPI > 4.41

AND

ER Status = Positive